



Course Synopsis

Course : UMTS Architecture & Planning

Duration: 3 Days

ETS Code : ETS442

Overview

This course is an UMTS System Overview with a bias towards radio planning and the ATM core network. As well as providing a comprehensive technical overview of UMTS functions, structure and operation, it covers transmission planning and traffic. ATM and other core technologies are described in depth. There is a major section on UMTS planning.

There is a strong bias in the course towards delegates who are involved with radio cell, capacity and transmission planning.

As UMTS is strongly based on GSM and GPRS, the course assumes a good familiarity with GSM and GPRS and their radio channels. No background in UMTS is assumed.

Course Aims and Objectives

The course will benefit delegates by providing

- an overall understanding of UMTS
- guidance of how transmission planning and traffic capacity for UMTS can be achieved
- a good understanding of the core network and ATM.

Course Contents

1. UMTS Overview.

- UMTS Service Model
- Circuits and Packets
- The Internet Protocol and TCP
 - Principles and Characteristics
 - The Effect of TCP on Traffic
 - Voice over IP
- UMTS Network Architecture
- R99 and R00 UTRAN
- Comparison of UMTS to GSM
- UMTS Bearer Services Capabilities [Packet & Circuit]
- UMTS QoS Classes
- UMTS Services

2. CDMA, its Principle and its Impact on the Network

- Multiple Access Methods
- Spread Spectrum

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- Benefits of CDMA
 - CDMA Basic Principle
 - Understanding CDMA
 - Soft Handover
 - Spreading & Scrambling
 - Codes & OVSF Code Tree
 - Power Control Introduction
 - Cell Breathing
 - The Near-far effect
 - UMTS frequency spectrum
 - Error Correction – Coding
 - Rake receivers
 - Multi User Detection [MUD]
- 3. System Architecture/Network Interfaces.**
- 3G System Architecture
 - 3G Network Building Blocks
 - 3g Network Interfaces
 - Service Platform
 - VHE
 - Signalling System No. 7 (SS#7)
- 4. W-CDMA Channel Structures.**
- Logical Channels
 - Transport Channels
 - Physical Channels
 - W-CDMA Frame
 - Rate Matching
- 5. Power Control & Handovers.**
- Open and Closed Loop Power Control
 - Hard Handover
 - Soft Handover
 - Softer Handover
 - Micro and Macro Diversity
 - Radio Resource Control
- 6. Air-Interface (RAN).**
- Node-B
 - WCDMA TRX
 - Radio Resource Control
 - Radio Resource Management
 - RNC
 - Admission Control
 - Load Control
 - Soft, Softer and Hard Handover
 - Discontinuous Transmission

7. **3G Capacity & Planning.**

- RNC Capacity Considerations
- Capacity of a Cell – Soft Capacity
- The Traffic Chain and Overheads
- Trunking and Grooming
- Traffic Management
 - The Erlang Calculations
 - Carried and Lost Traffic
 - Examples
- Channel Element Planning
- Transmission Capacity
- Co-existing with 2G
- 2G Co-Planning
- Intermodulation
- Isolation Requirements
- External Operator / Adjacent Channel Interference
- Uplink Calculations
- Planning with Adjacent Channel Interference
- Use of UMTS Radio Carriers
- Actual UK Spectrum Allocations
- Planning for Cities and Tunnels
- Summary of UMTS versus GSM Planning

8. **UMTS Call/Connection Transactions.**

- Call Set Up procedure
- Location Update
- Transaction Set up
- BS to BS handover
- RNC Relocation

9. **Core Network.**

- CN CS & PS Domains
- Mobility Management
- Cell Attach & Detach
- Session Management
- Packet Connections
- Physical Channels

10. **Core Network Technologies**

- Time Division Multiplexing
- PDH Links
 - E1, E3, T1
 - Problems with the PDH hierarchy
- SDH
 - Principles of Operation
 - Frame Format
 - Performance & Management



- The Hierarchy
- ATM
 - Principles of ATM
 - Virtual Channels and Virtual Paths
 - Cell Formats
 - ATM Adaptation Layers
 - QoS and Traffic Types
 - Structure of AALs and SAAL
 - Addressing
 - Admission and Congestion Control
 - ATM Traffic Management
 - ATM and SDH
 - Inverse Multiplexing for ATM
- IP meets ATM – The Ceasefire is Called MPLS

11. UMTS Network Protocols

- Control Plane
- NBAP, RANAP & RNSAP protocols
- Radio Access Bearers
- RNC Relocations